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O. H. M. S.

W. J. Gerald
Deputy Minister.

LABORATORY
OF THE
INLAND REVENUE DEPARTMENT
OTTAWA, CANADA
BULLETIN No. 176
MUSTARD

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MUSTARD

OTTAWA, March 1, 1909.

WM. HIMSWORTH, Esq.,
Acting Deputy Minister of Inland Revenue.

SIR,—I beg to report upon 76 samples of Mustard, collected throughout the Dominion in January of this year.

Mustard has been made the subject of examination in this laboratory on two former occasions, viz. ;—in 1890 (95 samples, see Bulletin 19), and in 1897 (66 samples, see Bull. 50).

In Bulletin No. 19, the late Chief Analyst directs attention to the need of definite standards for mustard; and suggests the adoption of a minimum limit of 30 per cent. fixed oil for genuine mustard, and of 22 per cent. for compound mustard.

The importance of legalizing a definition of mustard is undeniable, and until this is done, I find it quite impossible to declare adulteration in any of the extremely variable samples, sold under this name.

That such definition should depend mainly upon a percentage of fixed oil in the article, is not so clear. The fixed oil of mustard is present in mustard seeds (both black and white) to the extent of about 25 per cent. : and the sifted farina of mustard contains this oil to about 35 per cent. or slightly higher. (Piesse and Stansell; The Analyst, 1880, p. 161).

But the value of mustard as a condiment does not depend upon the content of fixed oil. White mustard, which *per se*, has little condimental value, contains as much fixed oil as black mustard. Nor did the late Chief Analyst suggest the determination of fixed oil in mustard as being itself directly an element of value in the condiment, but rather as a means of ascertaining the amount of foreign material present in admixtures. This added material is usually starch or turmeric, and is practically fat free.

Since the fixed oil in mustard seed is fairly constant, the suggestion to make the percentage of fixed oil in mustard flour a basis for calculating the amount of foreign matter added is a reasonable one, provided that mustard seed is always ground in its natural state, i.e., without removal of any portion of the fixed oil. This, however, is not the case. The oil greatly interferes with the pulverizing of the seed, and over 75 per

cent. of it may be removed by pressure before grinding, so that estimation of the fixed oil in the finished product, affords no trustworthy basis for calculation as to foreign matter added. The fixed oil of mustard is a bland oil, applicable to various dietetic purposes, but quite devoid of such condimental properties as are valued in mustard.

The characteristic pungency of mustard is due to a volatile oil, only traces of which exist in the dry mustard, but which is developed, by the action of a ferment (myrosin) upon potassium myronate, in the presence of water. It is only upon mixing mustard with water that the pungent flavour is developed. Potassium myronate is present to the extent of about 1.5 per cent. in black mustard seed, and is practically absent from white mustard. This latter contains only traces of volatile oil as such, while about half of one per cent. is present in the black seed. It follows, from what has been said, that the better way of valuing mustard, would be by direct estimation of its volatile oil, after a treatment converting potassium myronate into this last.

It is found in practice, that although the white mustard seed contains no potassium myronate, its presence in admixture with the black seed assists in the generation of volatile oil from the latter; and for this reason the two varieties are ground together. This is due to the fact that a ferment (myrosin) whose presence determines the conversion of potassium myronate into volatile oil of mustard, is more largely present in white than in black mustard, although the glucoside (*sinigrin*) upon which it acts, to develop the volatile oil is practically absent from white mustard. A glucoside (*Sinigrin*) exists in white mustard, which, when acted upon by water in presence of myrosin, yields an oil (*Sinigrin* mustard oil) which has the pungent, burning taste, and vesicating properties of the volatile oil of black mustard; but this oil is only slightly volatilized with steam, and its presence does not materially interfere with the estimation of volatile mustard oil. (Allylisothiocyanate).

From the work of Piesse and Stansell already quoted, F. Sutton (*Allen's Commercial Organic Analysis*; vol. III, part 3, p. 116); Schlicht (*Zeits. Anal. Chem.* XXX. 661), and others, I am of opinion that the determination of volatile oil of mustard is practicable as a means of assaying commercial mustard; and I hope to investigate this matter more fully at an early date.

The following definition of mustard has been adopted by the United States Department of Agriculture (Circular No. 13, Dec. 20, 1904, p. 11):—

"Ground Mustard is a powder made from mustard seed, with or without the removal of the hulls and a portion of the fixed oil, and contains not more than two and five tenths (2.5) per cent. of starch and not more than eight (8) per cent. of total ash."

This definition leaves much to be desired, as it makes no reference to the component (volatile oil) upon which the real value of ground mustard depends, whether considered as a condiment, or as a vesicant.

It will be seen on looking through the tables in this report, that very few samples of mustard found on the Canadian Market are free from starch and turmeric. Nor is it to be understood that the addition of starch and turmeric is made for purposes of fraud. Certain brands of this condiment, which have been on the world's markets for generations, and have received recognition and honours at International Exhibitions, are avowedly mixtures of mustard farina with other materials. The public have approved of these compounds; and other manufacturers have, on this account, been led to imitate them. It may be, as alleged by some makers, that the presence of starchy matters is necessary, to give better keeping quality to the article, which without starch, tends to become lumpy and sticky; that turmeric is desirable to give a pleasing colour to mustard, especially when mixed with water for the table; that the removal of a large percentage of the fixed oil is necessary to permit of satisfactory grinding and sifting. On the other hand, it is claimed that the seeds of white mustard although not possessed of the pungent properties essential to mustard as a condiment, contain the finer and distinctive flavours of mustard, and are as necessary to the production of a desirable condiment as the black mustard. And further that even the same variety of seeds exhibits so great differences in crops of different years that it is impossible to make satisfactory blends except under the guidance of an expert, who is guided rather by the cultivated senses of taste, and smell, than by varietal differences in the seeds themselves. However this may be, it is certain that mustard should be sold for what it is; and that the presence of added matters should be announced on the label.

The question of the amount of added matters which may be permitted is serious, from the point of view of the use of mustard as a domestic remedy, in blisters, poultices, emetics, &c. The mustard of the pharmacopœias permits of no admixture. Mustard as a condiment is another matter, and the public should learn to recognize the distinction between the two. Condimental mustard may be regarded as a substitute, in emergency, for the pharmacopœal mustard, but by no means to be confused with this last.

But even as a condiment, there is a degree of dilution which amounts to fraud. The fixing of limits defining mustard for condimental purposes is under consideration. The problem is not a simple one, and I am not yet in a position to submit a formal solution. I would respectfully recommend the publication of this report as Bulletin No. 176.

I have the honour to be, Sir,

Your obedient servant,

A. MCGILL,

Chief Analyst.

BULLETIN No. 176—MUSTARD.

Date of Collection.	Nature of Sample.	No. of Sample.	Name and Address of Vendor.	Cost.		Name and Address of Manufacturer or Furnisher as given by the Vendor.	Inspector's Report.	RESULTS OF ANALYSIS.			Remarks, and Opinion of the Chief Analyst.
				Quantity.	Cents.			Reducing matters by acid.	Starch, calculated as starch.	Microscopical Examination.	

1906.

DISTRICT OF NOVA SCOTIA—R. J. WAUGH, INSPECTOR.

Jan. 12	Mustard.	33816	Jas. Hogan, Halifax, N.S.	1 lb.	66	Coleman, London, Eng.	.....	3.50	25.63	Mustard & wheat starch	
" 12	"	33817	Jas. Scott & Co., Halifax, N.S.	1 "	15	J. J. Coleman, London, Eng.	.....	4.16	16.65	" " "	
" 14	"	33818	J. L. Archibald & Son, Halifax, N.S.	1 "	10	" " " Durham Brand "	.....	3.34	29.13	Mustard, wheat starch & turneric.	
" 14	"	33819	W. Taylor, Halifax, N.S.	1 "	10	Dunn, London, Canada	.....	5.10	6.84	" " "	
" 15	"	33820	E. B. Tracey, Halifax, N.S.	1 "	08	C. H. Cochran & Co., Ottawa, Ont.	" Imperial Brand "	2.96	33.07	" " "	

DISTRICT OF PRINCE EDWARD ISLAND—THEO. MOORE, INSPECTOR.

Jan. 8	Mustard.	31433	Connolly Bros., Charlottetown.	1 lb.	09	Auld Bros., Charlottetown.	.....	1.96	5.31	Mustard, wheat starch & turneric.	
" 11	"	31434	Bruce & McKay, Summerside.	1 "	10	Pure Field Mfg. Co., Toronto.	.....	2.84	55.12	" " "	
" 11	"	31435	D. McKenzie, Kensington.	1 "	10	Raynart & Co., London, Eng.	Mfg. from select seed, warranted superior quality.	1.40	46.12	" " "	
" 12	"	31436	R. Tuplin & Co., Kensington.	1 "	"	J. H. Schwartz & Son, Halifax.	Taken from package labelled "Imperial Mustard Compound."	2.10	.....	" " "	Sold as admixture.
" 12	"	31437	Geo. W. McLeod, Hunter River.	1 "	10	N. Rattenbury Co. Ltd., Charlottetown.	.....	3.04	.....	" " "

DISTRICT OF NEW BRUNSWICK—J. C. FERGUSON, IN

Jan.	8	Mustard....	29867	Harry G. McBeath, St. John, N.B.	10	J. J. Colman, London, Eng.	"Colmans Fine "	3 74	17 10	Mustard & wheat starch
"	16	"	29868	Halt Morrison & Co., Fredericton, N.B.	12	"	"Colmans Durham mustard admixture.	2 80		Mustard, wheat starch & turmeric.
"	19	"	29869	C. L. Olmstead, Perth, Victoria Co., N.B.	10	"	"	3 38		"
"	20	"	29870	Benjamin Beveridge, Andover, Victoria, N.B.	15	Dearborn & Co., St. John, N.B.	"Natural Brand " compound.	5 90		"
"	27	"	29871	James Mailer, New castle, N.B.	10	J. J. Colman, 108 Canon St., London, Eng.		3 64		Mustard & wheat starch Sold as admixture.

DISTRICT OF QUEBEC—E. BELAND, INSPECTOR.

Jan.	14	Mustard....	36838	Arthur Rinfret, 414 St. Joseph St., Quebec.	15	U. Francoeur, Quebec.	6 46	Mustard & turmeric...
"	14	"	36839	"	25	Unknown.....	3 54	Mustard & a little wheat starch.
"	14	"	36840	Arthur Drolet, 714 St. Valier St., Quebec.	25	Turcotte & Freres, Quebec.	3 90	Mustard & wheat starch
"	14	"	36841	"	45	U. Francoeur, Quebec.	5 55	Mustard & a trace of turmeric.
"	15	"	36842	Hamel & Bedard, 728 St. Valier St., Quebec.	15	Turcotte & Freres, Quebec.	3 66	Mustard, wheat starch & turmeric

DISTRICT OF ST. HYACINTHE—J. C. ROULEAU, INSPECTOR.

Jan.	11	Mustard...	928	Mde. David Grenier, Sorel.	15	C. Labelle & Co., Sorel.	2-64	31-06	Mustard, wheat starch & turmeric.
"	11	"	924	Marchisault & fils, St. Ours.	45	Hudson Herbert & Co.	3-74	"	Mustard, wheat starch & a trace of turmeric.
"	11	"	925	A. Thur Proulx, St. Ours, Loch.	08	E. D. Marceau & Cie, Montreal.	1-84	34-65	Mustard, wheat starch & turmeric.
"	12	"	926	D. Parent, Yamaska.	10	Not known.	2-00	34-65	"
"	12	"	927	Adelard Robert, Farnham.	10	Canada Direct Tea Trading Co., Montreal.	3-60	53-55	"

BULLETIN No. 176—MUSTARD.

Date of Collection.	Nature of Sample.	No. of Sample.	Name and Address of Vendor.	Cost.		Name and Address of Manufacturer or Furnisher as given by the Vendor.	Inspector's Report.	RESULTS OF ANALYSIS.			Remarks, and Opinion of the Chief Analyst.
				Quantity.	Cents.			Total Ash.	Reducing matters by acid solution starch.	Microscopical Examination.	

DISTRICT OF MONTREAL—J. J. COSTIGAN, INSPECTOR.

Jan. 4	Mustard....	35661	H. G. Smith, Montreal	4 lb.	10	Rose & Laflamme, Montreal.	...	3.50	20.70	Mustard & wheat starch	Sold as admixture.
" 4	"	35662	Kyle & Stevenson, Montreal.	4 "	10	Not known.....	...	2.40	52.38	Mustard, wheat starch & turmeric.	
" 7	"	35663	Richer & Page, Valley field, P.Q.	4 "	10	.....	The admixture is guaranteed free from any injurious ingredients.	1.40	.....	" "
" 11	"	35664	Geo. Dixon, Huntingdon, P.Q.	4 "	05	Not known.....	Durham Mustard..	2.26	21.05	" "	
" 12	"	35665	Pierre Poirier, St. Gabriel de Brandon, P.Q.	4 "	08	"	.....	2.84	38.92	" "

DISTRICT OF OTTAWA—J. A. RICKEY, INSPECTOR.

Jan. 6	Mustard....	22786	Estate Late Chas. Leque, River Desert, P.Q.	4 lb.	07	Not known.....	Sold as mustard...	2.00	45.72	Mustard, wheat starch & turmeric.	Sold as admixture.
" 8	"	22787	The Sanders Soule & Casselman Co., Chertville, O.	4 "	08	Hudson Herbert & Cie., Montreal,	"	1.45	48.15	" "	
" 11	"	22788	Brown Bros., Richmond	4 tin.	14	Not known.....	Sample labelled Keens Mustard. Also labelled admixture.	3.80	.....	Mustard & wheat starch
" 13	"	22789	A. Parkinson, Kemptonville.	4 lb.	10	Dalley & Co., Hamilton	Sold as mustard...	2.54	55.35	Mustard, wheat starch & turmeric.	
" 19	"	22790	Kavanagh Bros., Ottawa, Wa.	4 "	10	Not known.....	"	2.94	24.70	" "	

" 19	"	"	22790	Kavanagh Bros., Ottawa.	10	Not known.	"	2-94	24-70	"	"	"
				W.H.								

DISTRICT OF KINGSTON—JAS. HOGAN, INSPECTOR.

13648—2

Jan. 11	Mustard.	39416	R. Elvins, Belleville.	25	Keens, London.	3-60	10-45	Mustard & wheat starch.
" 11	"	39417	H. E. Fairfield, Belleville.	15	J. M. Lowes, Toronto.	2-14	34-42	Mustard, wheat starch & turneric.
" 11	"	39418	J. Curtis, Port Hope.	30	Keens, London.	4-00	3-87	Mustard & wheat starch.
" 11	"	39419	F. H. Brown, Port Hope.	30	"	4-60	6-26	"
" 12	"	39420	A. J. Roulty, Peterboro.	20	Dunn, Hamilton.	2-70	54-58	Mustard, wheat starch & turneric.

DISTRICT OF TORONTO—H. J. DAGER, INSPECTOR.

1909.

Jan. 5	Mustard	36166	M. Sweeney, Sherbo- rne St., Toronto.	5	Dalton Bros., Toronto.	1-84	29-70	Mustard, wheat starch and turneric.
" 5	"	36167	P. Kelly, Sackville St., Toronto.	7	"	2-18	48-37	"
" 12	"	36168	J. A. Williamson, Hamilton.	10	Not known.	2-82	51-97	"
" 12	"	36169	James Main, Hamil- ton.	7	The F. F. Dalley Co., Labeled Dalley's pure mustard guaranteed by the F. F. Dalley Co. Ltd.	6-00	None	Mustard and turneric.
" 15	"	36170	R. H. Watson, St. Catharines.	7	Gardiner, Dunn & Co., Hamilton.	3-00		Mustard, wheat starch and turneric.
" 26	"	36176	C. Collard, Toronto.	5	Not known.	1-56	59-17	"

DISTRICT OF LONDON—T. KIDD, INSPECTOR.

Jan. 6	Mustard	30553	Chas. Nairn, Goderich.	35	J. Farrow Co, Peter- boro, England.	4-14		Mustard and wheat starch.	Sold as admin- ture.
" 6	"	30555	J. J. McEwin, Goderich.	30	Not known.	3-84		"	Sold as admin- ture.
" 8	"	30560	Richard Smith, Sea- forth.	30	Gorman, Eckert & Co., London, Ont.	1-54		Mustard, wheat starch and turneric.	"
" 11	"	30565	E. A. McEwen, Clin- ton.	10	"	1-40	56-70	"	"
" 12	"	30569	W. H. H. Stoneman, Mitchell.	30	Canada Grocery & Spice Co., London, Ont.	2-82		"	Sold as admin- ture.

BULLETIN No. 176—MUSTARD.

Date of Collection	Nature of Sample.	No. of Sample.	Name and Address of Vendor.	Cost.		Name and Address of Manufacturer or Furnisher as given by the Vendor.	Inspector's Report.	RESULTS OF ANALYSIS.			Remarks and Opinion of the Chief Analyst.
				Quantity.	Cents.			Reducing matter by acid conversion as starch.	Total Ash.	Microscopical Examination.	

1900.

DISTRICT OF WINDSOR—J. TALBOT, INSPECTOR.

Jan. 7	Mustard....	34729	Jas. Fraser, Sarnia....	4 lb.	15	Keens, London, Ont....	3.64	7.26	Mustard and wheat starch.	Sold as compounded.
" 7	"	34732	W. C. Palmer, Sarnia....	4 "	10	Not known.....	.....	3.14	8.84	Mustard, wheat starch and turneric.
" 7	"	34734	R. Wanless & Co., Sarnia....	4 "	08	Tollhunter & Mitchell, Toronto.	Not sold as pure mustard.	3.40	.....	"
" 8	"	34740	C. R. Pully, Petrolia....	4 "	08	Canada Spice & Grocery Co., London, Ont.	.....	2.82	54.45	"
" 8	"	34741	Fred. Seabrook, Petrolia....	4 "	08	"	"Crest" Brand.	2.90	37.68	"	

DISTRICT OF MANITOBA—A. C. LARIVIERE, INSPECTOR.

Jan. 14	Mustard...	35785	J. C. Callander & Co., Hartney.	4 lb.	15	Keens Mustard, London, Eng.	4.12	13.95	Mustard and wheat starch.	
" 14	"	35786	D. Sutherland, Hartney.	4 "	25	The Gold Standard Mfg. Co., Winnipeg, M.	.....	4.25	None....	Mustard.
" 19	"	35787	Findlay, Speer & Sons, Sheol Lake.	4 "	10	Campbell Bros, Wilson, Winnipeg.	.....	3.50	37.80	Mustard, wheat starch and turneric.
" 20	"	35788	Geo. Manson & Sons, Strathclair.	4 "	15	Keens Mustard, London, Eng.	.....	3.84	10.44	Mustard and wheat starch.
" 21	"	35789	C. McLearn, Winnipeg.	4 "	10	Genuine London Mustard.	.....	3.66	45.00	Mustard, maize starch and turneric.

DISTRICT OF CALGARY—R. W. FLETCHER, INSPECTOR.

Jan. 18	Mustard.	33396	Copas & Emerson, Calgary.	10	L. T. Mewburn & Co. Ltd., Calgary.	2 32	40 72	Mustard, wheat starch and turneric.
" 18	"	33397	C. J. Winn, Calgary.	10	Campbell, Wilson & Horne, Calgary.	2 34	52 42	"
" 18	"	33398	Hudsons Bay Co., Cal- gary.	15	Keen, London, Eng.	3 74	18 83	Mustard and wheat starch.
" 18	"	35399	Calgary Milling Co., Cal- gary.	10	Todhunter, Mitchell & Co., Toronto.	3 10	56 92	Mustard, wheat starch and turneric.
" 18	"	36370	J. A. Nolan, Calgary.	15	Canada Spice & Grocery Co., London, Ont.	2 60	53 95	"

DISTRICT OF VANCOUVER—J. F. POWER, INSPECTOR.

Jan. 16	Mustard.	37551	A. Frederickson, Mo- untain View, Van- couver.	10	Kelly Douglas & Co., Vancouver.	2 78	40 5	Mustard, wheat starch and turneric.
" 16	"	37552	W. Clark, Vancouver.	1 Tim.	"	4 26		Mustard and wheat starch as mixture.
" 15	"	37553	Direct Supply Co., Van- couver.	10	Clinax Mfg. Co., Van- couver.	3 86	42 75	Mustard, wheat starch and turneric.
" 15	"	37554	H. C. McQuarrie, Van- couver.	1 Tim.	— Coleman.	3 90	18 45	Mustard and wheat starch.
" 15	"	37555	J. McArthur, Van- couver.	15	J. J. Coleman	4 20	3 97	Mustard and a little wheat starch.

DISTRICT OF VICTORIA—D. OSULLIVAN, INSPECTOR.

Jan. 20	Mustard.	39274	Windsor Grocery Co., Ltd., Victoria.	1 Tim.	Fallow & Co., Peter- borough, Eng.	1 10	19 90	Mustard and wheat starch.
" 20	"	39275	Copas & Young, Victo- ria.	15	J. J. Coleman, Lon- don, Eng.	4 06	15 97	Mustard, wheat starch and turneric.
" 20	"	39276	Wm. B. Hall, Victoria,	3 Pags	A. Shilling & Co., San Francisco, Cal.	5 96	None	Mustard.
" 21	"	39277	W. A. Jamieson Coffee Co., Victoria.	10	F. F. Dalley, Hamil- ton, Ont.	6 00	None	Mustard and turneric.
" 25	"	39278	Wm. B. Hall, Victoria.	30	Pioneer Coffee & Spice Mills, Victoria, B.C.	3 90	22 95	Mustard, wheat starch and turneric.

Labeled Fallow's
"A. 1" Mustard,
also labeled ad-
mixture.
Colonial mustard.
an admixture.
"Shilling's" best
mustard.
Taken from a brl.
in factory.
"Bull Dog" Brand,
Pure English
mustard—not
sold as high grade
mustard.